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J.R. Simplot Company
P.O. Box 912,
Pocatello, Idaho 83204
208 235-5600 Business

June 18, 2018

Arthur Burbank
USDA Forest Service
4350 South Cliffs Dr.
Pocatello, ID 83204

**Subject: Biological Selenium Removal Treatment Technology
Water Treatment Pilot Study
May 2018 Progress Report**

Dear Art,

This progress report summarizes key activities in May 2018 associated with Phase 2 of the Water Treatment Pilot Study located near Hoopes Spring. This Pilot Study is being conducted as part of the Smoky Canyon Mine Remedial Investigation/Feasibility Study (RI/FS) to provide information on the effectiveness of the active biological treatment system in removing selenium and other COPCs from South Fork Sage Creek Springs and Hoopes Spring.

Work related to the approved Phase 2 Pilot Study continues at the site in accordance with the *Final Phase 2 Pilot Study Work Plan and Sampling and Analysis Plan, Ultra-Filtration/Reverse Osmosis and Biological Selenium Removal Fluidized Bed Bioreactor Treatment Technology (Phase 2 WP/SAP)*.

Identification of Deliverables and Data Transmittals

There were no outstanding deliverables or transmittals for the month of May. At the time of this report, laboratory data for the Week 9 through Week 14 sampling has been received. Preliminary laboratory data are presented in Table 1 and Table 2. The field data for the Week 9 through Week 14 sampling event is summarized in Table 3.

Completed Activities

The following activities associated with the Phase 2 Pilot Study were completed in May 2017:

- Continued system operation and treatment of selenium.

The Treatment System Pilot (TSP) influent concentration for Week 9 through Week 14 were 144 ug/L to 158 ug/L. The Treatment System Pilot effluent concentration for Week 9 through Week 14 ranged from 20.3 ug/L to 82.1 ug/L. The removal efficiency ranged from a low of 46% to 87% total selenium removal.

During week of April 23rd a contractor was performing some work on the FBRs. On May 10th we received the results from operational samples collected on April 26th which showed that FBR #1 was not performing as designed. We immediately inspected the system and found a kinked nutrient feed line to FBR #1. Without the nutrient FBR #1 stopped treating selenium and so the





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TSP was effectively running on one FBR for approximately 3 weeks. The line was repaired and the FBR was brought back online. Based on followup sampling, the system recovered quickly and the most recent sample from May 23rd showed a reduction of selenium from 158 ug/L to 20.4 ug/L in the effluent (87% reduction).

The average flow of the TSP was 1,567 gpm for May. Since full scale operations began in early December 2017 approximately 440 million gallons of impacted water has been treated.

Upcoming Activities

The following activities associated with the Phase 2 Pilot Study are planned through June 2018:

- Continue system monitoring in accordance with the sampling and analysis plan.
- As shown below in the updated Table 3-8 from the Pilot Study Work Plan, extend the monitoring program 7 additional weeks to account for the FBR #1 downtime.

Table 3-8: Pilot Study Monitoring, Sampling, and Analysis Schedule (updated)

Week (System Status)	Sampling Frequency	Sampling Locations	Analyses to be Performed ^a
Week 0 ^b (Initial Steady State Flow After Start Up)	One-time	Influent, Effluent Blend Tank, UF Backwash UF permeate flow to RO skids; RO permeate flow to blending tank; RO concentrate flow to the FBRs; Bioreactor Effluent from FBR #1; Bioreactor Effluent from FBR #2; Sand filter #1 effluent; Sand filter #2 effluent	Full analytical suite ^c
Week 1 ^b (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Full suite ^c
Week 2 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Focused suite ^d
Week 3 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Full suite ^c
Week 4 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Focused suite ^d
Week 5 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Full suite ^c
Week 6 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Focused suite ^d
Week 7 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Full suite ^c
Week 8 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Focused suite ^d
Week 9 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Full suite ^c
Week 10 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Focused suite ^d
Week 11 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Full suite ^c
Week 12 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Focused suite ^d
Week 13 (Operational)		No samples collected	
Week 14 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Focused suite ^d
Week 15 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Full suite ^c
Week 16 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Focused suite ^d
Week 17 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Full suite ^c
Week 18 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Focused suite ^d
Week 19 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Full suite ^c
Week 20 (Operational)	Weekly	Influent, Effluent Blend Tank, UF Backwash	Focused suite ^d
Review and statistically evaluate the results from Weeks 0-20. Simplot and the Agencies will discuss refinement of the interim water quality target parameters. With justification, some of the parameters in the full analytical suite may be eliminated based on the results from Weeks 0-20 ^e . Furthermore, upon receipt of results from Weeks 0-20, Simplot will calculate expected water quality concentrations at key locations downstream of the treatment facility for discussion with the Agencies.			
Week 22 and every other week thereafter (Operational)	Bi-weekly	Influent, Effluent Blend Tank, UF Backwash	Focused suite ^d
Once per quarter (quarterly sample also meets requirement for bi-weekly sample)	Quarterly	Influent, Effluent Blend Tank, UF Backwash	Full suite ^c
Operational – Immediately Prior to Shut Down	One-time	Same as Week 0 locations	Full suite ^c



J.R. Simplot Company
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Pocatello, Idaho 83204

Please contact me if there are questions regarding this monthly progress report. 208 235-5600 Business

Sincerely,

Jeffrey Hamilton
Environmental Engineer

cc:

Arthur Burbank – USFS, 410 East Hooper, Soda Springs, ID 83276
Sherri Stumbo – USFS, 4350 South Cliffs Dr., Pocatello, ID 83204
Rick McCormick – CH2M, email only
Doug Scott – CH2M, email only
Doug Tanner – IDEQ, email only
Brady Johnson – IDEQ, email only
Kathryn Venable – IDEQ, email only
Colleen O'Hara – BLM, email only
Matt Wilkening – USEPA, email only
Sandi Fisher – USFWS, email only
Jeremy Moore – USFWS, 4425 Burley Dr., Suite A, Chubbuck, ID 83202
Kelly Wright – Shoshone-Bannock Tribes, P.O. Box 306, Fort Hall, ID 83203
Susan Hanson – (b) (6)
Gary Billman – IDL, email only
Alan Prouty – J.R. Simplot Company, email only
Burl Ackerman – J.R. Simplot Company, email only
Lori Hamann – J.R. Simplot Company, email only
Jon Witt – J.R. Simplot Company, 1099 West Front Street, Boise, ID 83702
Dedra Williams – J.R. Simplot Company, email only
Chad Gentry – J.R. Simplot Company, email only
Ron Quinn – J.R. Simplot Company, P.O. Box 1270, Afton, WY 83110
Andy Koulermos – Formation Environmental, email only
Lily Vagelatos – Formation Environmental, email only
Jeremy Aulbach – Brown and Caldwell, email only

**Table 1
Laboratory Results Full Analyte List**

Hoopes Springs Water Treatment Plant Pilot Study
Phase 2, 12-Week Performance Monitoring

Station >>	Week 9			Week 11		
	Influent	Ultra Filtration Backwash	Effluent	Influent	Ultra Filtration Backwash	Effluent
Sample ID >>	SC0418-LSSHS-IN003	SC0418-LSSHS-UFB003	SC0418-LSSHS-EF003	SC0518-LSSHS-IN001	SC0518-LSSHS-UFB001	SC0518-LSSHS-EF001
Date >>	4/18/2018			5/2/2018		
Analyte	Units					
General Chemistry						
Alkalinity, Total as CaCO3	mg/L	210	50	190	210	140
Bicarbonate, as CaCO3	mg/L	210	50	190	210	140
Carbonate, as CaCO3	mg/L	1 U	1 U	1 U	1 U	1 U
Ammonia, as N	mg/L	0.026 U	0.026 U	0.026 U	0.026 U	0.026 U
Biochemical Oxygen Demand	mg/L	2 U	2 U	2 U	2 U	2 U
Chemical Oxygen Demand	mg/L	5 U	5 U	5 U	5 U	5 U
Chloride	mg/L	10.8	2.31	14.2	10.9	10.3
Fluoride	mg/L	0.385	0.155	0.429	0.522	0.327
Hardness, as CaCO3	mg/L	256	51.8	249	246	197
TDS	mg/L	466	168	444	155	116
TOC	mg/L	0.5 U	0.5 U	0.5 U	0.588 J	0.5 U
TSS	mg/L	2 U	2 U	2 U	2 U	2 U
Nutrients						
Nitrate + Nitrite, as N	mg/L	0.313	0.138	0.703	0.38	1.08
Nitrate, as N	mg/L	0.31	0.14	0.7	0.38	1.08
Sulfate	mg/L	56.9	15.7	66.4	58.5	46.5
Sulfide	mg/L	1 U	1 U	1 U	1 U	1 U
Phosphorus, Total	mg/L	0.0215	0.0268	0.226	0.0392	0.173
Major Cations and Anions						
Calcium, Dissolved	mg/L	64.3	13.2	66.4	60.4	44.5
Magnesium, Dissolved	mg/L	24.2	4.9	25.1	22.7	16.9
Potassium, Dissolved	mg/L	0.844	0.299 J	1	0.683	0.631
Sodium, Dissolved	mg/L	7.46	1.82	7.82	7.05	5.46
Metals and Metalloids						
Aluminum, Dissolved	mg/L	0.0358 J	0.0276 J	0.0125 J	0.0258 J	0.0221 J
Aluminum, Total	mg/L	0.0076 U	0.0352 J	0.0139 J	0.0224 J	0.0225 J
Antimony, Dissolved	mg/L	0.0000732 U	0.0000732 U	0.0000732 U	0.0000732 U	0.0000732 U
Antimony, Total	mg/L	0.0000732 U	0.0000732 U	0.0000732 U	0.0000732 U	0.0000732 U
Arsenic, Dissolved	mg/L	0.000398 U	0.000398 U	0.000398 U	0.000398 U	0.000424 J
Arsenic, Total	mg/L	0.000494 J	0.000398 U	0.000398 U	0.000542 J	0.001 J
Barium, Dissolved	mg/L	0.051	0.0101	0.0308	0.0497	0.0187
Barium, Total	mg/L	0.0513	0.013	0.0373	0.0531	0.0283
Beryllium, Dissolved	mg/L	0.000047 U	0.000047 U	0.000047 U	0.000047 U	0.000047 U
Beryllium, Total	mg/L	0.000047 U	0.000047 U	0.000047 U	0.000047 U	0.000047 U
Boron, Dissolved	mg/L	0.0148 J	0.00925 J	0.0159 J	0.0138 J	0.013 J
Boron, Total	mg/L	0.0184 J	0.0121 J	0.0185 J	0.0178 J	0.0166 J
Cadmium, Dissolved	mg/L	0.0000362 U	0.0000362 U	0.0000362 U	0.0000362 U	0.0000362 U
Cadmium, Total	mg/L	0.0000557 J	0.0000362 U	0.0000362 U	0.0000362 U	0.0000362 U
Chromium, Dissolved	mg/L	0.000499 J	0.000248 J	0.000433 U	0.000904 J	0.00048 J
Chromium, Total	mg/L	0.000665 J	0.000424 J	0.000778 J	0.000928 J	0.000922 J
Cobalt, Dissolved	mg/L	0.0000698 J	0.0000318 U	0.00498	0.000105 J	0.00669
Cobalt, Total	mg/L	0.0000783 J	0.0000407 J	0.00504	0.000121 J	0.00777
Copper, Dissolved	mg/L	0.0000418 U	0.0000418 U	0.0000418 U	0.0000822 J	0.000225 J
Copper, Total	mg/L	0.0000418 U	0.0000418 U	0.0000418 U	0.000286 J	0.001 J
Iron, Dissolved	mg/L	0.01 U	0.0325 J	0.0184 J	0.01 U	0.0387 J
Iron, Total	mg/L	0.065	0.108	0.893	0.0777	0.692
Lead, Dissolved	mg/L	0.0000554 U	0.0000554 U	0.0000554 U	0.0000554 U	0.0000554 U

**Table 1
Laboratory Results Full Analyte List**

Hoopes Springs Water Treatment Plant Pilot Study
Phase 2, 12-Week Performance Monitoring

Station >> Sample ID >> Date >> Units	Week 9			Week 11			
	Influent	Ultra Filtration Backwash	Effluent	Influent	Ultra Filtration Backwash	Effluent	
	SC0418-LSSHS-IN003	SC0418-LSSHS-UFB003	SC0418-LSSHS-EF003	SC0518-LSSHS-IN001	SC0518-LSSHS-UFB001	SC0518-LSSHS-EF001	
	4/18/2018			5/2/2018			
Analyte							
Lead, Total	mg/L	0.0000554 U	0.0000586 J	0.0000554 U	0.0000675 J	0.0000554 U	0.0000554 U
Manganese, Dissolved	mg/L	0.000315 J	0.002	0.00972	0.000491 J	0.000476 J	0.00604
Manganese, Total	mg/L	0.000828 J	0.00385	0.00988	0.000797 J	0.00174	0.00813
Mercury, Dissolved	mg/L	0.00005 J	0.000052 J	0.000046 J	0.000072 J	0.000071 J	0.00007 J
Mercury, Total	mg/L	0.000053 J	0.000052 J	0.00005 J	0.000071 J	0.000088 J	0.000085 J
Molybdenum, Dissolved	mg/L	0.000934 J	0.000177 J	0.0024	0.000789 J	0.000429 J	0.00242
Molybdenum, Total	mg/L	0.00102	0.000224 J	0.00235	0.00082 J	0.00047 J	0.00266
Nickel, Dissolved	mg/L	0.0000533 U	0.0000533 U	0.00412	0.00065 J	0.000172 J	0.0066
Nickel, Total	mg/L	0.0000533 U	0.00018 J	0.00487	0.000751 J	0.000327 J	0.0088
Selenium, +4 (selenite)	mg/L	0.000171	0.00005 U	0.0149	0.00005 U	0.00005 U	0.015
Selenium, +6 (selenate)	mg/L	0.127	0.0249	0.00146	0.138	0.0775	0.0445
Selenium, Dissolved	mg/L	0.145	0.0277	0.0184	0.143	0.0797	0.0643
Selenium, Total	mg/L	0.146	0.0271	0.0203	0.144	0.0807	0.069
Silver, Dissolved	mg/L	0.0000172 U	0.0000172 U	0.0000172 U	0.0000172 U	0.0000172 U	0.0000172 U
Silver, Total	mg/L	0.0000325 J	0.0000172 U	0.0000172 U	0.0000172 U	0.0000172 U	0.0000172 U
Thallium, Dissolved	mg/L	0.0000657 U	0.0000657 U	0.0000657 U	0.0000657 U	0.0000657 U	0.0000657 U
Thallium, Total	mg/L	0.0000657 U	0.0000657 U	0.0000657 U	0.0000657 U	0.0000657 U	0.0000657 U
Uranium, Dissolved	mg/L	0.0016	0.000275 J	0.00156	0.00158	0.000858 J	0.00136
Uranium, Total	mg/L	0.00163	0.000297 J	0.00159	0.0017	0.000941 J	0.0016
Vanadium, Dissolved	mg/L	0.00128 J	0.000448 J	0.000675 J	0.000965 J	0.000487 J	0.00085 J
Vanadium, Total	mg/L	0.00242	0.00158	0.00193	0.00254	0.00219	0.00324
Zinc, Dissolved	mg/L	0.00932	0.00161 J	0.00169 J	0.0208	0.00172 J	0.00198 J
Zinc, Total	mg/L	0.0124	0.00215 J	0.00521	0.0183	0.00206 J	0.0036 J

Notes:

Results presented are preliminary, and have not been validated at the time of this report.

U - Analyte not detected above the method detection limit (MDL).

J - Result is estimated.

Table 2
Laboratory Results Focused Analyte List

Hoopers Springs Water Treatment Plant Pilot Study
Phase 2, 12-Week Performance Monitoring

Station >>	Week 8			Week 10			Week 12			Week 14		
	Influent	Ultra Filtration Backwash	Effluent	Influent	Ultra Filtration Backwash	Effluent	Ultra Filtration Backwash	Influent	Effluent	Ultra Filtration Backwash	Influent	Effluent
Sample ID >>	SC0418-LSSH5-IN002	SC0418-LSSH5-UFB002	SC0418-LSSH5-EF002	SC0418-LSSH5-IN004	SC0418-LSSH5-UFB004	SC0418-LSSH5-EF004	SC0518-LSSH5-UFB002	SC0518-LSSH5-IN002	SC0518-LSSH5-EF002	SC0518-LSSH5-UFB003	SC0518-LSSH5-IN003	SC0518-LSSH5-EF003
Date >>	4/11/2018			4/25/2018			5/9/2018			5/23/2018		
Analyte	Units											
General Chemistry												
Ammonia, as N	mg/L	0.026 U	0.0317	0.0287 J	0.026 U	0.026 U	0.026 U	0.026 U	0.028 U	0.026 U	0.026 U	0.026 U
Biochemical Oxygen Demand	mg/L	2 U	2 U	2 U	2 U	2 U	4	2 U	2 U	2 U	2 U	2 U
TSS	mg/L	2 U	2 J	2 J	2 J	2 U	2 U	6	2 U	2 U	2 U	2 U
Nutrients												
Nitrate, as N	mg/L	0.3	0.11	0.53	0.33	0.07	1.2	0.16	0.36	1.13	0.16	0.33
Phosphorus, Total	mg/L	0.0795	0.0368	0.282	0.0321	0.0143	0.372	0.0479	0.0358	0.0689	0.0209	0.0123
Sulfide	mg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Metals and Metalloids												
Selenium, Dissolved	mg/L	0.143	0.0249	0.0194	0.141	0.0146	0.052	0.0357	0.143	0.8735	0.0408	0.155
Selenium, Total	mg/L	0.139	0.026	0.0115	0.146	0.0179	0.0602	0.0408	0.152	0.8821	0.0398	0.158

Notes:
Results presented are preliminary, and have not been validated at the time of this report.
U - Analyte not detected above the method detection limit (MDL).
J - Result is estimated.

Table 3 Field Water Quality Data

Hoopes Springs Water Treatment Plant Pilot Study
Phase 2, 12-Week Performance Monitoring

		Parameter >>	Dissolved Oxygen	ORP	pH	SC	Temperature	Turbidity
		Units >>	mg/L	mV	SU	umhos/cm	C	NTU
Station	Sample ID	Date						
Week 8								
Influent	SC0418-LSSHS-IN002	4/11/2018	7.08	204	7.68	452	13.09	0
Ultra Filtration Backwash	SC0418-LSSHS-UFB002	4/11/2018	6.96	213	7.42	87	12.98	0
Effluent	SC0418-LSSHS-EF002	4/11/2018	7.24	197	7.5	319	12.95	0
Week 9								
Influent	SC0418-LSSHS-IN003	4/18/2018	7.25	147	7.64	452	12.81	0
Ultra Filtration Backwash	SC0418-LSSHS-UFB003	4/18/2018	7.19	157	7.19	110	12.87	0
Effluent	SC0418-LSSHS-EF003	4/18/2018	7.53	137	7.47	444	12.84	0
Week 10								
Influent	SC0418-LSSHS-IN004	4/25/2018	6.95	175	7.49	450	13.01	0
Ultra Filtration Backwash	SC0418-LSSHS-UFB004	4/25/2018	7.24	113	7.52	74	13	0
Effluent	SC0418-LSSHS-EF004	4/25/2018	7.37	131	7.98	613	13.04	0
Week 11								
Influent	SC0518-LSSHS-IN001	5/2/2018	10.59	151	7.7	455	12.7	0
Ultra Filtration Backwash	SC0518-LSSHS-UFB001	5/2/2018	5.99	149	7.66	273	12.95	0
Effluent	SC0518-LSSHS-EF001	5/2/2018	5.79	149	7.72	333	13.01	0
Week 12								
Influent	SC0518-LSSHS-IN002	5/9/2018	9.12	149	7.5	444	13.26	0
Ultra Filtration Backwash	SC0518-LSSHS-UFB002	5/9/2018	6.48	159	7.51	162	15.05	0
Effluent	SC0518-LSSHS-EF002	5/9/2018	9.52	90	7.67	357	13.85	0
Week 14								
Influent	SC0518-LSSHS-IN003	5/23/2018	7.39	137	7.92	452	13.51	0
Ultra Filtration Backwash	SC0518-LSSHS-UFB003	5/23/2018	8.1	137	7.33	155	13.2	0.4
Effluent	SC0518-LSSHS-EF003	5/23/2018	7.39	66	8.09	500	13.4	0